REMARKS

Applicants are filing concurrently herewith a RCE Transmittal for the above-identified application, in light of the Finality of the Office Action dated July 25, 2007. It is respectfully submitted that the present amendments constitute the necessary Submission under 37 CFR 1.114, for this RCE Transmittal. Moreover, in view of the concurrent fling of the RCE Transmittal, it is respectfully submitted that entry of the present amendments is clearly proper as a matter of right, notwithstanding Finality of the Office Action dated July 25, 2007.

The Examiner is thanked for the interview courteously granted to the undersigned and to Applicants' representative, in connection with the above-identified application, this interview being conducted by telephone on October 5, 2007. During this interview, it was indicated by the undersigned that claims would be amended to recite that the insulating resin composition layer contains polyamidoimide resin. In light of this amendment to the claims, differences between the present invention and the teachings of the applied references, U.S. Patent No. 6,132,489 to Ameen, et al., and European Patent Application No. 1,006,763 to Fujiwara, were discussed. In particular, the undersigned pointed out that the applied references do not disclose, nor would have suggested, such resin coated metal foil as in the present claims, wherein the insulating resin composition layer contains polyamidoimide resin. During the interview, the Examiner noted finality of the Office Action dated July 25, 2007, and raised an issue as to entry of claims amended to recite that the insulating resin composition layer contains polyamidoimide resin. During the interview, the undersigned indicated that a Terminal Disclaimer would be submitted in connection with the two provisional obviousness-type double patenting rejections in the Office Action dated July 25, 2007. No agreement was reached

during the interview.

In view of the issue raised by the Examiner as to entry of claims, after final rejection, reciting that the insulating resin composition layer contains polyamidoimide resin, Applicants are concurrently filing the enclosed RCE Transmittal, in order to ensure entry of the present amendments.

Applicants are amending their claims in light of discussions during the aforementioned interview, as well as to additionally define various aspects of the present invention. Specifically, Applicants are amending claims 1 and 16 to recite that the insulating resin composition layer contains polyamidoimide resin as principal ingredient. Note, for example, the sole full paragraph on page 17 of Applicants' specification.

In addition to amendments to claims 1 and 16, Applicants are adding new claims 55-63 to the application. Claim 55, dependent on claim 1, recites that the polyamidoimide resin is siloxane denatured polyamidoimide resin. Note, for example, Insulating Resin Composition 3 described on page 39 of Applicants' specification.

New claims 56-63 are directed to a printed wiring board, claim 56 being the sole newly added independent claim reciting a printed wiring board. Claim 56 recites that the printed wiring board has a conductor circuit of three layers of first electrolytic copper layer, electroless copper layer and second electrolytic copper layer, provided on an insulating resin composition layer, with an interfacial roughness and peel strength between the conductor circuit and insulating resin composition layer being defined. Claims 57 and 58, each dependent on claim 56, respectively recites a peel strength between the conductor circuit and insulating resin composition layer, and recites that an electroless nickel plating layer and an electroless gold plating layer

are further formed sequentially on the conductor circuit surface. Claims 59 and 60, each also dependent on claim 56, respectively recites a thickness of the first electrolytic copper layer, and recites an L/S of the conductor layer. Claims 61-63 are each also dependent on claim 56, and respectively recites material of the insulating resin composition layer; recites that the insulating resin composition layer contains a cyanate resin, with Ni treatment applied to one side of the first electrolytic copper layer contacting with the insulating resin composition layer; and recites that the insulating resin composition layer contains an epoxy resin and a latent curing agent. In connection with recitation of a printed wiring board, note, for example, pages 28-34 of Applicants' specification.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the prior art applied by the Examiner in rejecting claims in the Office Action dated July 25, 2007, that is, the teachings of U.S. Patent No. 6,132,589 to Ameen, et al., and European Patent Application No. 1,006,763 to Fujiwara, et al., under the provisions of 35 USC 103.

Specifically, it is respectfully submitted that the teachings of the applied references do not disclose, nor would have suggested, such resin coated metal foil, or such metal clad laminate, or such printed wiring board, as in the present claims, wherein the insulating resin composition layer contains a resin as set forth in claims 1 and 16 (that is, polyamidoimide resin), as principal ingredient, together with the metal foil, and wherein a thickness of the metal foil is not more than 3μm. Note claims 1 and 16, and claims 31 and 41.

Moreover, it is respectfully submitted that these applied references would have neither taught nor would have suggested such resin coated metal foil, or such

metal clad laminate, or such printed wiring board, as in the present claims, having features as discussed previously in connection with claims 1, 16, 31 and 41, and, moreover, wherein the insulating resin composition layer contains cyanate resin, with the anti-corrosion treatment being performed with a metal mainly containing nickel. See claim 7; note also claims 22 and 62.

Furthermore, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested such resin coated metal foil or such metal clad laminate or such printed wiring board as in the present claims, having features as discussed previously in connection with claims 1 and 16, and, moreover, the surface roughness of the metal foil as in claims 2, 17, 51 and 52, or the interfacial roughness between the insulating resin composition layer and the metal foil as in claims 4, 19 and 56; and/or the anti-corrosive treatment as in claims 6 and 21; and/or wherein the silane coupling agent chemically reacts with the insulating resin composition by heating (note claims 10 and 25); and/or wherein the insulating resin composition contains epoxy resin and the silane coupling agent contains amino functional silane (see claims 11 and 26); and/or wherein the insulating resin composition contains epoxy resin which is liquid at room temperature (see claims 13 and 28); and/or relative dielectric constant or dielectric loss tangent of the post-cure insulating resin composition as in claims 15 and 30; and/or wherein the metal foil is a copper foil (see claims 53 and 54) and/or the printed wiring board produced, as in claims 31 and 41, and having a peel strength as in claims 33, 34, 43, 44 and 57; and/or wherein the polyamidoimide resin is siloxane denatured polyamidoimide resin as in claim 55.

Moreover, it is respectfully submitted that the teachings of the applied references would have neither taught nor would have suggested such printed wiring

board as in the present claims, having the conductor layer of the specified three layers as in claim 56, provided on an insulating resin composition layer, with an interfacial roughness between the conductor circuit and the insulating resin composition layer, and peel strength, being that set forth in claim 56, more particularly, wherein a peel strength under specified conditions is that set forth in claim 57.

Furthermore, it is respectfully submitted that the teachings of the applied references would have neither taught nor would have suggested such printed wiring board as in the present claims, having features as discussed previously in connection with claim 56, and, additionally, wherein the board also includes an electroless nickel plating layer and electroless gold plating layer formed sequentially on the conductor circuit surface (see claim 58); and/or wherein the thickness of the first electrolytic copper layer is not more than 3μm (see claim 59); and/or L/S of the conductor layer, as in claim 60; and/or materials of the insulating resin composition layer as in claims 61-63, and with a Ni treatment being applied to one side of the first electrolytic copper layer contacting with the insulating resin composition layer, as in claim 62.

The present invention as claimed in the above-identified application relates to a resin coated metal foil and metal clad laminate, particularly suitable for printed wiring boards, and the printed wiring boards produced therefrom.

Recently, as demand for miniaturization, weight reduction and speeding-up of electronic equipment has increased, density growth of the printed wiring board has been investigated, particularly using a semi-additive process, the semi-additive process allowing finer wiring to be formed. However, various problems arise in connection with circuit formation on a resin coated metal foil by the semi-additive

process, including adherence of the metal foil to the resin. While it has previously been proposed to provide a roughened layer having a thickness of several micrometers for obtaining a given peel strength between the metal foil and a resin cured material, this obstructs thinning of the metal foil. Moreover, due to the irregularity of the roughened surface, there can disadvantageously be generated an etching residue, which causes a short-circuit failure, and electric resistance of a conductor circuit of the roughened layer increases so that transmission loss becomes larger.

While it has been proposed to utilize a copper foil in which the roughening treatment is not performed, utilizing a peroxide curing resin composition, under this approach it becomes necessary to use a peroxide curing resin as the insulating layer, but there is a fear that reliability of the printed wiring board manufactured with the copper clad laminate including the peroxide curing resin decreases. Moreover, as the peroxide curing resin itself is a potentially hazardous material, and has a greater cost than previously proposed insulating resins, use of the peroxide curing resin is not practical.

Against this background, Applicants provide a metal clad laminate and resin coated metal foil, and printed wiring board formed therefrom, having good adhesion and which can be provided and used at relatively low cost and which can be easily handled. Applicants have found that by utilizing a polyamidoimide resin as principal ingredient of the insulating resin composition layer, as in the present claims, together with the metal foil which has been subjected to an anti-corrosive surface treatment, a chromate treatment and a silane coupling treatment, and wherein the thickness of the metal foil is not more than 3μm, objectives according to the present invention are achieved. In particular, by providing a laminate/metal clad foil wherein the foil has a

thickness of not more than 3μm, treated as mentioned previously, with the principal ingredient of the insulating resin composition layer as discussed previously, the structure is excellent not only in adhesion of insulating resin layer and metal (e.g., copper) foil, but also in good wiring formability. In particular, as described in the sole full paragraph on page 21 of Applicants' specification, by providing the metal foil of thickness of not more than 3 μm, good wiring formability is achieved.

As described on page 17 of Applicants' specification, among the thermoplastic resins, the polyamidoimide resin is useful because it has good adhesion to the metal in addition to excellent heat resistance and humidity resistance. Moreover, in order to improve drying properties, it is also possible to use siloxane denaturization. See claim 55.

In addition, and as set forth in claims 7, 22 and 62, when cyanate resin is used as a resin to be contained in the insulating resin composition layer, and Ni treatment is applied as the anti-corrosive treatment, it is possible to obtain a resin coated metal foil and metal clad laminate extremely excellent in aspects including adhesion of insulating resin layer and foil, adhesion after heating and adhesion after a PCT (pressure cooker test).

Ameen, et al. discloses a treated copper foil, having a layer of zinc oxide adhered to a base surface of at least one side of the copper foil, the layer of zinc oxide having a thickness of about 3Å to about 80 Å, and a layer of a trivalent chromium oxide adhered to the layer of zinc oxide. This patent further discloses, in one embodiment, that the foil has a layer of a silane coupling agent adhered to the layer of trivalent chromium oxide. See column 2, lines 15-22. Note also column 2, lines 52-63; column 3, lines 1-6; column 4, lines 55-62; column 5, lines 19 and 20; and column 6, lines 47-50.

Fujiwara, et al. discloses a copper foil for making printed circuit boards, the copper foil comprising a copper layer, an alloy layer (A) comprising copper, zinc, tin and nickel which is formed on a surface of copper foil, and a chromate layer which is formed on a surface of the alloy layer, the surface to be laminated with a substrate for a printed wiring board. This patent document discloses that the copper foil may further have a silane coupling agent layer on a surface of the chromate layer. Note especially paragraphs [0016] – [0018] on page 3 of this patent document. Note also paragraphs [0026] – [0035] on page 4; and paragraphs [0043] – [0046] on page 5.

As seen in the foregoing, as well as from a full review of each of Ameen, et al. and of Fujiwara, et al., neither of these references would have disclosed nor would have suggested structure as in the present claims, including use of the polyamidoimide resin as principal ingredient; or a printed wiring board having the three-layer conductor circuit, with interfacial roughness and peel strength, or other features of the present invention as discussed previously.

As recognized by the Examiner in the last paragraph on page 3 of the Office Action dated July 25, 2007, neither of the applied references discloses the thickness of the copper foil. Particularly in view of the advantages achieved by the present invention with metal foil thicknesses as in the present claims, as indicated previously, it is respectfully submitted that Ameen, et al. and Fujiwara, et al. would have neither disclosed nor would have suggested the presently claimed invention, including metal (copper) foil thickness, particularly in view of the following. That is, note that Ameen, et al., in column 2, lines 43 and 44, discloses that the copper foils typically have nominal thicknesses ranging from about 0.0002 inch to about 0.02 inch. It is respectfully submitted that this thickness is about 5-500μm, greater than the thickness as in the present claims; and it is respectfully submitted that Ameen, et al.

would have taught away from the presently claimed subject matter, including thickness of the metal foil, and advantages thereof.

Note that in Example 1 in columns 11 and 12 of Ameen, et al., this patent document discloses a copper foil sample having a weight of $1oz/ft^2$, which is probably about 40 μm, further teaching away from the presently claimed subject matter. Fujiwara, et al. mentions use of copper foil of a thickness of 35μm in Example 1 on page 8, also teaching away from the relatively small thickness metal foil of the present claims. In view of the advantages achieved through use of the relatively small thickness metal foil as in the present claims, it is respectfully submitted that the presently claimed subject matter patentably distinguishes over the teachings of the applied documents.

The provisional obviousness-type double patenting rejections set forth in Items 2 and 3 on pages 4 and 5 of the Office Action dated July 25, 2007, are noted. Submitted herewith is a Terminal Disclaimer in connection with each of No. 10/986,919 and No. 11/044,533. Note that this Terminal Disclaimer terminally disclaims any patent term of the patent issuing from the above-identified application which extends beyond the expiration date of the full statutory term of any patent issuing from No. 10/986,913, which would inherently provide the necessary disclaimer in connection with No. 11/044,533, also. In view of the enclosed Terminal Disclaimer, it is respectfully submitted that the provisional obviousness-type double patenting rejections are moot.

The enclosed Terminal Disclaimer is being submitted in order to facilitate proceedings in connection with the above-identified application, so as to achieve earliest possible issuance of a U.S. patent based thereon. It is respectfully submitted that the submission of this Terminal Disclaimer does not constitute

agreement with, or an admission as to the propriety of, the provisional obviousness-type double patenting rejections; and does not constitute agreement with, or an admission as to the propriety of, arguments made by the Examiner in connection with the provisional obviousness-type double patenting rejections.

In view of the foregoing comments and amendments, and further in view of the concurrently filed RCE Transmittal, entry of the present amendments and of the enclosed Terminal Disclaimer, and reconsideration and allowance of all claims remaining in the above-identified application, are respectfully requested.

To the extent necessary, Applicants hereby petition for an extension of time under 37 CFR 1.136. Kindly charge any shortage of fees due in connection with the filing of this paper, including any extension of time fees, to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Account No. 01-2135 (case 1204.44255X00), and please credit any overpayments to such Deposit Account.

Respectfully submitted,

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